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ABSTRACT

This paper presents the design, underlying theory, and primary outcomes of the Multiple Model Preschool Program (MMPP), a three-year longitudinal early childhood intervention program which focused simultaneously on the three dimensions of parental involvement, home-school relations, and individualized education. In both homes and schools at three different geographic sites, the MMPP examined the effects of a multi-dimensional program on the growth of 134 low-income children identified at age three as potential academic high-risks. Results in the area of cognitive functioning of the children, as measured by a battery of standardized aptitude and achievement tests, revealed significant gains of a magnitude which supports the MMPP approach as a fruitful one for increasing the likelihood of academic success for this population. (Author)

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A Multi-Dimensional Approach to Successful Early Childhood Intervention

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Abstract

This paper presents the design, underlying theory, and primary outcomes of the Multiple Model Preschool Program (MMPP), a successful three-year longitudinal early childhood intervention program which focused simultaneously on the three dimensions of parental involvement, home-school relations, and individualized education. In both homes and schools at three different geographic sites, the MMPP examined the effects of a multi-dimensional program on the growth of 134 low-income children identified at age three as potential academic high-risks. Results in the area of cognitive functioning of the children, as measured by a battery of standardized aptitude and achievement tests, revealed significant gains of a magnitude which supports the MMPP approach as a fruitful one for increasing the likelihood of academic success for this population.

A Multi-Dimensional Approach to Successful Early Childhood Intervention

Over the past two decades, considerable attention has been focused, through the framework of early childhood intervention programs, on the relationship between the study of young children and the processes of education to be used in positively affecting their development. While controversy continues regarding the malleability of abilities and the value of intervention in remediating negative environmental effects on the capabilities of young learners (Nichols, 1979), there is widespread agreement that intervention programs have yielded considerable information about the impact of such efforts on child development and about the conditions which are likely to affect their immediate and long-term success.

Research which addresses the variety of issues raised by past intervention efforts continues to be an important area of focus; as Stedman (1977) suggests, ". . . longitudinal study of development in children is still the best strategy for discovering environmental effects" (p. 12). In providing guidelines for the continued study of the effects of intervention, reviewers, evaluators and researchers have repeatedly suggested that the following points be considered in implementing new intervention programs:

1. the importance of the role of the parent in intervention efforts and the corresponding need to discover more about the processes of parent-child interaction and methods of including parents in intervention (e.g., Clarke-Stewart, 1979; Gray & Klaus, 1970; Karnes & Zehrbach, 1977; Stedman, 1977);
2. the significance of continuity between preschool and primary experiences and the corresponding need to consider transitions between home and school at all levels of schooling (e.g., Bentley, Washington & Young, 1974; Ryan, 1975);

3. the importance of individualizing intervention efforts by tailoring curricula to meet the needs of particular children and the corresponding need to investigate the effects of alternative instructional models on individuals and groups of children (e.g., Stedman, 1977; Stodolsky, 1972; Weinberg, 1979);
4. the importance of studying intervention with a variety of groups of children in a mixture of settings and the corresponding need to explore the effects of community and cultural group on the transportability of programs (e.g., Day, 1977; Nichols, 1979; Stedman, 1977).

The purpose of this paper is to describe the design and underlying theory of the Multiple Model Preschool Program (MMPP) and to present and discuss the results in the area of cognitive functioning at the end of the experimental intervention. The MMPP was a three-year longitudinal research program concerned with the development and examination over time of procedures for improving the chances of attainment of academic success for young children from low-income families who were identified at age three as potential academic high-risks. The MMPP focused simultaneously on the effects of parent-child, parent-teacher, and child-teacher interactions on the learning and development of the children. The program was designed to directly promote success in later schooling for children who might not otherwise succeed by providing increased curricular and extra-curricular experiences to both children and their families.

The strategy employed in the design of the MMPP was to provide a comprehensive approach to intervention based on a multi-dimensional foundation which reflects the points listed above. The three dimensions, or components, selected to guide the design of the MMPP and a rationale for their selection are:

1. The inclusion and meaningful involvement of parents;

In common with most of the early childhood intervention programs instituted in the 1960's, the MMPP had its theoretical roots in the work of Hunt (1961), Bloom (1964), Deutsch (1964) and others who highlighted the critical effects of the environment on children's cognitive abilitites during the first five years of life and the increased likelihood of effecting a positive change in those abilities during that period. One of the results of that work has been the increased recognition of the importance of the parent in providing the foundation for the development of the social, emotional, and intellectual competencies necessary for successful functioning in schooling and later life. In its design, the MMPP considered the findings of researchers who had focused their interventions on the home environment (e.g., Karnes, Teska, Hodgins & Badger, 1970; Karnes & Zehrbach, 1977; Levenstein, 1970). In agreement with Bronfenbrenner's comments (1974), it was felt that assisting parents in increasing their ability to successfully interact with and promote the growth of their child was an essential dimensions for an intervention program which might produce long-term effects. Thus, rather than concentrating solely on the child as the recipient of the intervention, the MMPP focused on both parent and child and was implemented in both home and school.

2. The establishment of strong home-school relations;

Related to the recognition of the home environment as a potent influence on the development of the child and the need to provide parents with opportunities for maximizing that environment is the importance of the relationship between home and school. First, it was felt that the movement from home tc school should be one which

considered and built upon the values and strengths of the home environment while simultaneously permitting the presentation and reinforcement of school-related activities in the home. Second, since target families were frequently those who viewed the school as aversive and/or were not comfortable in visiting the school or interacting with school personnel, it was felt that an active process of introducing the parents to school facilities and staff was a necessary adjunct to any intervention program. The MMPP was, therefore, designed to create and/or strengthen the relationship between home and school.

3. The provision of <u>individualized educational programming</u> within the framework of alternative curricular strategies.

Viewing children as individuals with individual educational and developmental needs and capabilities requires schools and teachers to evaluate and define the individual needs of the child in order to provide educational programs to meet those needs. The explosion of research which applied knowledge of development and learning to preschool intervention, as an antidote to social disadvantage, had produced a variety of cogently presented and empirically tested strategies of intervention with children in classroom settings (e.g., Bereiter & Engelmann, 1966; Weikart, 1971). The design of the MMPP utilized the existence of those alternative educational strategies in its approach. Rather than pursuing the question of which <u>single</u> educational strategy might be best for <u>all</u> children with potential academic problems, however, we sought to answer the question of which of <u>several</u> strategies might be best for which <u>individual</u> child or group of children. Through the provision of alternative curricular strategies within one program and

under one roof, we hoped to attain the type of flexibility in the MMPP necessary to meet the needs of individual children while simultaneously applying an empirical approach to the acquisition of knowledge about each strategy and its effects on children.

Thus, the MMPP was created as an attempt to "put it all together." In this effort, it concentrated on parents, children, and teachers, took place in both home and school settings, and was instituted over a relatively long time period which encompassed both preschool and kindergarten experiences.

Method

Preparations for Implementation

Site and Staff Selection and Description. To obtain information concerning the generalizability of the program, a large urban, small urban, and rural community were selected as the three MMPP sites, thus providing for three simultaneous replications of the design within different settings. At each site, the staff consisted of the site coordinator, who administered the program on a day-to-day basis, and three certified early childhood teachers. When the program became school-based, instructional aides were added to the staff; at various time intervals, external examiners and observers were hired to collect data.

In order to provide for individualized instruction, the teachers were selected as representative of widely divergent educational strategies; in addition, they were selected to have skills necessary to enable them to learn to lead parent groups, conduct home visits, and implement the classroom models. While the teachers were to function as home visitor, teacher and group leader as well as collector of large amounts of data, an accurate test of the design dictated that few, if any, "stars" be selected; indeed, the generalizability of this program is in large measure dependent on its feasibility for use with representative samples of teachers.

Site coordinators were hired first and then participated in the process of selecting the teachers at their site. Each site coordinator had a master's degree and teaching experience as well as skills and experiences in the areas of parent education, curriculum development, and research. The nine teachers were selected predominantly on the basis of their different styles as determined by their previous experiences and their responses to interview questions about their preferences for scheduling of activities, arranging materials, providing direct instruction, and grouping of students for instruction. The home visitation, group leadership, and research functions were taught, using in-service training across sites, director site visits, and close on-site supervision and staff development as the vehicles for assisting teachers in meeting the role expectations of the MMPP. Since the program was to be implemented in three geographically separated sites and the expectations for the staff required close communication both across and within sites, the staff received their training together as frequently as possible. The in-service sessions also functioned as an important motivator with respect to establishing and maintaining the commitment of the staff to program objectives and tasks.

Subject (S) Selection and Description. Staff members were familiarized with the forms and instruments necessary to implement the process of participant selection; verbal instructions and simulation techniques were employed to train teachers in methods of interpersonal interaction pertinent to the initial contacts with families. Recruitment plans were generated by each site within previously established guidelines and the staff began the process of identifying and recruiting potential MMPP participants.

Following the identification stage, each interested family was personally visited by one of the teachers; a thorough description of the MMPP was provided. Immediately following the visit, the teacher summarized her discussion with the family, indicating reasons for parental interest in the program and her

impressions of the child, the parent(s), the home environment, and the discussion. This information was subsequently summarized and reviewed by the program directors.

Families who met the income level criterion (below 70%, state median income) were further screened; if the checklists completed during the initial home visit indicated that the child or the home environment could be characterized by one or more of the following variables, the family was considered eligible for the program:

1. Home environment characterized by a high level of stimulus deprivation or disorganization;
2. Low school achievement of older siblings;
3. Apparent or documented delay in cognitive or language development of the child;
4. Expressed concern by the parent about child-rearing abilities or parents' own achievements in school.

By design, families considered for acceptance into the MMPP were representative of both low-income and low middle-income groups. This allowed the MMPP to reach a broader group of potentially academic high-risk children than had some earlier intervention programs as well as provided a mix of children more representative of the heterogeneous sample of children with whom the participants would later attend school.

In the same vein, each site was represented by families reflecting, insofar as possible, the racial/ethnic background of that community and/or school attendance area. Throughout the program, the racial balance at the large urban site was approximately 55% White-45% Black; the small urban site approximately 75% White-25% Hispanic; and the rural site approximately 95% Whites of Eastern European background.

Each family which met the specified criteria was accepted into the program; families were then informed of their eligibility. A total of 134 families were accepted for September of School Year (SY) I entry into the MMPP; 45 families at the large urban site, 47 families at the small urban site, and 42 families at the rural site. A home visit was scheduled for each family to provide additional information about the MMPP to parents, to obtain information about the individual needs of each child for purposes of planning the home-based instructional program, and to begin to build the parent-child-teacher relationship. Pre-testing was scheduled and implemented for all participants. A description of the MMPP participants in terms of demographic and entrance criterion variables is provided in Table 1.

Insert Table 1 about here

In summary, the mean income of our population was approximately $8,800.00 and around 38% were single parent families. The mothers in our program averaged about 27 years of age, and had completed an average of about 12 years of school; the fathers averaged about 29½ years of age and had completed an average a little less than 12 years of school. In comparison to the general population, families were considerably lower in income and slightly lower in education level (U.S. Statistical Abstracts, 1976).

The Intervention Program

The emphases on parental involvement, home-school relations, and individualized educational experiences were actualized through four sequential programmatic phases. The program began in the home and was gradually phased into a school-based experience; the link between home and school was maintained throughout

the three years through parent group meetings and home visits. As each of the phases is described below, particular attention is given to delineating the processes of intervention used in every phase to teach the parents to assume responsibility for home teaching, to positively influence parent-child interaction patterns, and to match the children to one of the three alternative classroom strategies on the basis of their individual styles and needs.

Phase One (September, SY I-February, SY I). Phase One addressed the child in the home environment in recognition of the primary role of the home in early socialization and learning and in an attempt to insure the continuous participation and involvement of parents in all aspects of the MMPP. It consisted of home teaching visits involving the parents, child, and teacher in a curriculum individually designed by the teacher in conjunction with the site coordinator and directors to meet the child's needs; child play groups emphasizing early socialization and free play experiences; and parent group meetings focusing on parental interaction about child-rearing and educational topics. In essence, Phase One was an attempt to build a solid foundation for shared educational decision-making between parents and teachers; it was a time for establishing trust and building relationships while concurrently learning about the strengths and needs of each child and building and offering an instructional program based on that information.

Home visits were held weekly with hourly visits scheduled at a time convenient for the parent(s). The long-term intent of the home visit was to move from teacher-child teaching interactions with parent observing to parent-child teaching interactions with teacher observing. This focus on parent-as-teacher remained throughout the program. Parent group meetings were held in the school building weekly during Phase One. Choices of morning, afternoon, and evening sessions were offered to parents to provide a schedule flexible enough to meet parental needs and encourage parental involvement. These discussion

groups, led by the teachers, provided a forum for presentation of information on child development and other topics of interest to parents of three-year-old children and served as a vehicle for building a cohesive parental group which would eventually assume more responsibility for the nature and leadership of the parent meetings. During the parent meetings and the home visits, staff members placed an emphasis on increasing parents' observational skills and verbal interactions. Child play groups were held during the parent meetings in another MMPP classroom and provided care for both MMPP children and their siblings; the play group also presented an opportunity to observe each child in a group situation and to familiarize the child with the school prior to the time when he/she would attend without parents.

Phase Two (March-June, SY I; September-December, SY II). Phase Two provided for the transition from home to school and emphasized the gathering of data appropriate to the eventual placement of children in one of three classrooms appropriate to their individual learning style and needs. It consisted of child participation in each of the three alternative classroom learning environments and continuation of parent group meetings and home visits emphasizing parent-child interaction and the parent-as-teacher.

In February of SY I, three alternative classrooms were operationalized at each site in preparation for Phase Two. Children were randomly assigned to one of three groups which remained intact throughout the Spring, SY I semester and the Fall, SY II semester. Each group of children was then assigned, again randomly, to one of the three classrooms for a period of three weeks, called a triad. After each triad was completed, children switched to a different classroom (one triad at one site was missed in the spring semester due to a teacher strike in that school district), ~~Provided~~ providing the opportunity to gather information relevant to determining which style of classroom most suited the needs of which child. With the exception noted above, each child thus exper-

ienced each classroom for a period of six weeks.

At each site, the three alternative classrooms were created by operationalizing the differing philosophical orientations of the teachers which had earlier played a role in their hiring. On a continuum ranging from lesser to greater teacher-directedness, each site generally consisted of one open classroom type situation, one cognitively-oriented classroom which combined group and individual work, student and teacher-directed instruction, and one highly structured, more didactic type of classroom. In certain cases, where teacher characteristics and motivation dictated, actual curriculum models were used (e.g., Weikart classrooms operated at two of the three sites, a modified DISTAR approach was used at one of the sites).

Generally, however, the emphasis was not on making a teacher fit a model but, conversely, on matching the classroom to the differing philosophical orientation the teacher had when she entered the program. It was felt that individual differences of children could best be met within the framework of classrooms where the individual strengths of teachers were best utilized.

Parents were frequent visitors to and assistants in the classrooms; parent meetings continued; home visits continued; school conferences were introduced and served as a vehicle for exchange of information on the child's performance and reaction to a particular strategy and as an additional opportunity to increase parental skill and input in educational decision-making. Children attended school for a total of six hours per week at each site.

Phase Three (January-June, SY II; September, SY II- February, SY III). Phase Three provided for the continuation of the school-based program. Children were placed in one of the three alternative classrooms. The placement occurred through a process of examining results of the data collected during Phases One and Two and obtaining parental, teacher, and site coordinator input (Wiviott & Waller, 1977). Parent group meetings continued and were focused on parental

teaching in the home and parental interaction with teachers and principals; home visits continued to emphasize parent-child interaction and the parent-as-teacher and were also used as an additional method for conferencing about individual children's academic progress. While much attention has been given in recent years, through aptitude-treatment interaction research, to the significance of studying interactions between learner variables and classroom environments in order to tailor instruction for particular types of learners (see, e.g., Berliner & Cahen, 1973), the attempt to place children in classrooms on the basis of such individual differences is largely untried, particularly at the preschool level. During Phase Two, as children participated in each learning environment, information pertinent to effecting that placement was being collected predominantly by teachers, and also by site coordinators and independent observers. The areas assessed were:

1. The child's overall response to each environment, including abi ity to adapt to each classroom and ease or difficulty in establishing a relationship with the teacher within that classroom;
2. The child's interest level, including the number and variety of tasks attempted, frequency of tasks selected, and degree of follow-through exhibited with tasks and materials selected in each classroom;
3. the child's learning style, as inferred from the accommodation made by the student to the differing structures of each classroom;
4. the child's achievement level, as measured by performance level attained on teacher-made and standardized measures within each classroom.

This information, in conjunction with parental preferences and teacher and site coordinator judgments, was used to make a preliminary placement of each child in one of the three classrooms. The objectives of the placement was to find the environment in which the child could best actualize his/her potential; it was anticipated that some changes in placement would occur over time.

Phase Four (March-June, SY III). Phase Four emphasized the transition from the MMPP to the primary school curriculum and instructional strategy. In addition to the classroom, parent group, and home visit components, it involved the inclusion of primary school teachers in the programming. The third year of the MMPP coincided with the children's kindergarten year. Thus, the second part of Phase Three and all of Phase Four consisted of the presentation of a kindergarten curriculum for the children. Each site was instructed to cover the local kindergarten curriculum in classroom instruction in addition to continuing the goals of the strategy being employed in each classroom.

In order to prepare the children for what was likely to be a more structured experience in first grade, teachers were asked to include additional small and large group, teacher-directed instruction in all classrooms, during the latter part of Phase Four. For some classrooms, this required no change in procedure; for others, particularly the open classrooms, it did require some transitional work. Parental transition was also considered during Phase Four; parents were acquainted with the expectations of primary school staff for their children in grade one by primary teachers and were assisted during parent meetings in identifying methods for continuing their active involvement in school-related matters after the program had ended.

Results

An evaluation at this time of the success of the MMPP as an intervention program rests predominantly on responses to the question: Did significant positive changes in children's performance occur over the period of implementation? Addressing this question requires examination and evaluation of the gains made by the children involved in the MMPP, in the area of cognitive skills, in order to focus attention directly on the issue of whether these children are more likely to achieve success in later schooling than they were when they entered the program. Tables 2 through 7 and Figure 1, which present performance

levels attained by children on four instruments at various time points provide information on that question.

Over the three-year implementation period of the MMPP, four standardized tests were administered to the Ss at each site: the Peabody Picture Vocabulary Test (Dunn, 1965), the Cognitive Skills Assessment Battery (Boehm & Slater, 1974), the Denver Developmental Screening Test (Frankenburg, Dodds, & Fandal, 1973), and the Cooperative Preschool Inventory (Caldwell, 1970). The Peabody Picture Vocabulary Test (PPVT) and the Cognitive Skills Assessment Battery (CSAB) were administered eight times during the project: beginning and end of SY I; beginning, middle, and end of SYs II and III; the Denver Developmental Screening Test (DDST) was administered five times: beginning and end of SY I; beginning, middle, and end of SY II; and the Cooperative Preschool Inventory (CPSI) three times: beginning, middle and end of SY III.

Alternative forms of the PPVT were employed to insure a time lapse of nine months between any administrations of the same form. Although alternative forms are not available for the other measures, the administration of the CSAB and DDST require response to different items dependent on the performance and/or age of the S; the shortest test-retest interval for any item of any instrument was three months.

Table 2 and Figure 1 present the mean percentile scores from eight administrations of the PPVT over the three years of the project. The PPVT, as a widely used aptitude test focusing on verbal ability, can be used to evaluate the overall success of the program. Table 2 reveals that for each school year the mean gains made by the participants across all three sites were statistically significant (correlated, 2-tailed t-tests, d.f.= 97:SY I: $t= 6.27$ $p < .00000001$; SY II: $t=3.57$, $p < .0006$; SY III: $t= 4.02$, $p < .0001$); and, the mean gain over the full three years of the program was even more significant ($t= 13.35$, $p << .0001$[a]).

[a]The symbol "<<" is used to indicate "much less than".

Insert Table 2 about here

Parenthetically, we note that 14 students were untestable on the PPVT at Time 1. An anlysis of the mean differences of the percentiles at the end of the project between this group of 14 children and the group of seven children who scored at the 0^{th} percentile at Time 1 showed no significant end of project difference ($t = 1.46$, d.f.= 19, NS). Therefore, for the analysis of the PPVT, these untestables were considered to have scored at the 0^{th} percentile. If these untestable children are omitted from Time 1 the mean percentile changes from 32.63 to 38.07; the mean gain over SY I reported above is still highly significant (2-tailed correlated t-test: $t = 11.53$, d.f.= 97, $p << .0001$).

Substantively, a more meaningful significance of these results is revealed by focusing on yearly growth as presented in Figure 1. Here we see an overall steady growth as compared to the median ability of the population at large as measured by this test (solid line at the 50th percentile). The MMPP children as a whole (solid curve) begin at three years of age scoring on average <u>below</u> 67.4% of the population and finish at the end of their kindergarten year averaging <u>above</u> 73.3% of the general population. Within each school year, the curves of two of the sites can be seen to closely approximate this same growth.

Insert Figure 1 about here

The curve for the large urban site (dashed), while indicating significant growth over the three years ($p < .0000004$), reveals that the yearly rate of growth declines over this period from an average of 2.0 percentile points per month in SY I to 0.2 percentile points per month in SY III. One possible

explanation for this decline in rate of growth is the fact that the average attendance at the parent group meetings at the large urban site fell from a high of 80% during the first semester of SY I to 29% during the last semester of SY III, while attendance at the parent meetings at the other two sites was maintained at a fairly high level (Small urban average attendance: First semester SY I 81%; last semester SY III 72%; Rural average attendance: First semester SY I 75%, last semester SY III 53%).

The above analysis of the PPVT as well as the analyses of the other instruments discussed below are based on the 98 Ss who were participants in the project for its full three-year duration. As can be expected when conducting in situ research of this kind, attrition did occur, although when a participant left the project she/he was replaced, maintaining the number of participants throughout the project at approximately 135 families.

A question which is pertinent to the overall evaluation of the MMPP is: Were the children who left the program before the end performing at a different level, specifically at a significantly lower level, than the remaining Ss at the time of leaving? The performance of these children on the PPVT, as illustrated in Table 3, is representative of their overall performance in this regard and can appropriately be used to examine this question. Comparing each group in this table to the full-term participants completing the project (Table 2, column 1) we see that the 14 Group A children, those remaining at least two years, score higher than the full-term participants at every time point. The 13 Group B children, those remaining between one and two years, do not differ significantly from the full-term participants at any of the comparable time points. Finally, we see that the seven Group C children, who remained less than one year, average substantially, though not statistically significantly, below the full-term participants upon entrance into the program. In summary, 27 of the 36 students leaving the project before completing three years were

seen to be performing at or above those children who remained in the project, while those children leaving during the first year were below the full-term participants upon entrance into the project and may or may not have responded well to the intervention had they remained longer.

Insert Table 3 about here

The CSAB is an achievement test geared specifically to four-year old preschool and five-year old kindergarten populations, measuring Orientation to the Environment (OE), Coordination (CORD), Discrimination (DISC), Memory (MEM), and Comprehension (COMP). Norms are available for this test for each item in terms of the percentage of the children in the norming groups passing the item. To obtain the data presented in Table 4, the item percentages were averaged over all the items in each subscale of the test. (Some items in the CSAB allow for a score of partial pass. All figures presented in this paper are based on a complete pass of each item of the CSAB.) There are two groups in the norming sample, a low SES group and a middle SES group. Focusing on the second and third years of the project, since three-year old norms are unavailable, we see that for each subscale of the CSAB, the MMPP children in Fall of SY II are somewhere close to or below the lower SES norms and by the end of the project in the Spring of SY III are above the middle class norms. It is noteworthy, perhaps, that even after only one year, the MMPP children are already scoring above the low SES norms on three of these five subscales. Corresponding data by site are presented in Table 5; with minor exceptions, the results again parallel the results for the group as a whole.

Insert Tables 4 and 5 about here

The DDST, an instrument designed to provide screening of developmental delay in young children, was employed during the first two years of the project. The DDST classifies children into four categories: Abnormal, Questionable, Untestable, and Normal. The results of screening of the MMPP children are presented in Table 6. Although abbreviated percentile norms are also available for this instrument, the standardization sample is considered to be defective with respect to geographic sampling as well as with respect to sampling of various subgroups (Buros, 1972); consequently, the results are presented in terms of the proportions of the MMPP students which fall in each of the basic four categories mentioned above.

At the beginning of the project, approximately 38% of the MMPP children were classified as other than "Normal," indicating some developmental delay in more than one-third of the participants. By the end of the second year, this percentage had dropped to less than 7% representing only six children, all of whom were classified as Questionable and none of whom was classified as Abnormal. Of the six Ss classified as Questionable at the end of SY II, five finished the project a year later with a PPVT percentile score better than 68; the average of these five at this point was the 80th percentile (S.D.= 8.1). The remaining child in this group finished the project at the same very low level at which he had begun. The DDST was dropped after the second year of the program at which point too many of the children were found to be performing at or near the ceiling of the test, implying that continuation of the test into the third year of the project would be psychometrically inappropriate.

Insert Table 6 about here

The CPSI was chosen to replace the DDST during the final year of the MMPP

because it is viewed as a test "which is sensitive to changes associated with educational intervention," and was "developed to give a measure of achievement in areas regarded as necessary for success in school," (Buros, 1972, pp. 730-731). Table 7 presents the mean percentile scores for this test for all sites grouped together and for each site separately. The figures in this table reveal that by the beginning of SY III the MMPP children had already attained a high level of achievement in the areas necessary for school success as measured by this instrument and that at each site, as well as grouped across sites, the children proceeded to further master the skills in these areas during the final year, finishing above the 92nd percentile.

Insert Table 7 about here

Discussion

The results reported in the preceding section present a profile of a successful early childhood intervention program. Three applications of the MMPP design in differing geographic locations with populations of differing racial and ethnic background yielded a similar pattern of outcomes: children who, as a group, entered the program performing below a sizable proportion of their age peers left the program performing at a cognitive level above a sizable proportion of those peers, as measured by four aptitude and achievement tests used in the MMPP to assess such growth. Significant positive changes in the children's performance levels, then, did occur over the implementation period and occurred at a level of magnitude which suggests that these children, as a group, entered primary school more prepared to achieve academic success than they were at the program's outset.

Comparisons of the scores obtained by the MMPP participants to the PPVT norming group, buttressed by the SES gains on the CSAB subscales, the substantial

reduction in developmental delays recorded on the DDST, and the mastery of those areas regarded as necessary for success in school as measured by the CPSI provide a clear indication in a quasi-experimental manner of the overall success of the program. In discussing the results of the MMPP as an intervention program, we will focus on those issues relevant to further explication of the results actually obtained and to future replications of this type of approach to intervention.

We begin with a discussion concerning the estimation of success rates for subgroups defined by time of leaving the program. Figure 2 presents a histogram of the PPVT percentile scores at the end of the project. This histogram suggests two possible cut-off points for separating the group into successful and unsuccessful intervention groups: below and above the 40th percentile; and below and above the 60th percentile.

Figure 2

Frequency Histogram for End of Project PPVT Percentile Scores

Observation Interval		
0 to 10	1	*
10 to 20	3	***
20 to 30	3	***
30 to 40	3	***
40 to 50	9	*********
50 to 60	3	***
60 to 70	13	*************
70 to 80	16	****************
80 to 90	14	**************
90 to 100	33	**********************************

While in elementary schools many scores even below the 40th percentile would not be considered failure and this point may, therefore, be too high for the purpose of estimating a success rate for the program, we will nevertheless define an unsuccessful intervention as one which left the child scoring below the 40tn percentile on the PPVT at the end of the program. This cut-off point reveals ten such children among the MMPP participants. Therefore, an estimate of the success rate for the full-term children, children remaining the full three years, would be: R_{FT}= 88/(10 + 88)= .90 or 90%.

There were also 36 children who were admitted to the project and left before the full three year duaration. We have already seen that 27 of these children remained in the project for at least one year and that their PPVT scores at each available time point indicate that these children were responding to the program essentially the same as the 98 who completed it (analyses based on the other instruments described in this paper support this conclusion). Therefore, we would estimate the success rate for this group also to be around 90%.

The remaining nine children left the project after only a few months. Five left simply because they moved out of the district, but with respect to the last four we feel it may be best to assume that the act of leaving may constitute a failure on the part of the program. We therefore conclude that the overall success rate can be calculated based on the following data:

Group	N	Successful Interventions	Unsuccessful Interventions
Full-Term	98	98	10
One or More Years	27 x (.9)	24	3
Less than One Year	9	5	4
	134	117	17

Overall Success Rate, R= 117/134= .87 or 87%

It is interesting to consider further the group of unsuccessful interventions within the 98 full-term Ss. Nine out of these 10 began the project with a PPVT percentile score of five or less. While one would expect that the probability of successful intervention with such a group of children would be lower than in the intervention population as a whole, there exists an additional 22 children in the full-term group who also began the project performing at or below the 5th percentile on the PPVT who completed the program with an average score at the 73rd percentile on the PPVT (S.D.= 19.5; minimum= 40th; maximum = 98th). Therefore, we would estimate that the success rate for extremely high-risk children, lowest 5%, can be expected to be R_{EHR}= 22/(9 + 22)= .71 or 71%.

The next issue we consider is the relationship of the design of the MMPP to the results obtained. This issue concerns a consideration of the relative contribution of the various dimensions of the program. To determine exactly the relative contribution of each component to the program requires, of course, experimental manipulation of the various aspects of the program. Nevertheless, the information, both formal and informal, which was gathered on the three primary components of the project-- parent involvement, home-school relations, and individualized education-- leads us to conclude that all three components are clearly necessary, both in terms of their individual contributions and in terms of the contribution they provided in combination.

In terms of individual contributions, the components concerned with parent involvement and home-school relations played a particularly important role. The home visits are of prime importance because through that method a successful attempt can be made to affect a change in the interaction between the parent and the child and to assist parents in assuming increased responsibility for teaching the child at home (Waller & Waller, 1980).

Of equal importance, we feel, are the parent groups and the related fact

that their meetings were held in the school buildings. The familiarity with school facilities and personnel which resulted from the frequent parent meetings in the school has laid the foundation, we believe, for continued meaningful involvement of the parents with their children's education. Of greater importance is the contribution of the parent groups themselves to the overall success of the program. Though only informally documented, for example, through parent evaluation of the program, we feel that the mutual support provided by these groups for each of the participants was invaluable in producing the gains reported in this paper.

An examination of the data used to make the child-classroom match for Phases Three and Four indicates that here, too, an important contribution was made. While roughly three-quarters of the children could have been placed in any of the three available classrooms at each site with little change to be expected in the results, we argue that the availability of such a choice was necessary for all MMPP participants.

First, the fact that a decision was to be made regarding the type of classroom into which each child was eventually to be placed provided a necessary unifying task for everyone involved, the staff as well as the parents. Second, the emphasis on alternative curricular strategies provided an opportunity for the teachers to further articulate their goals and methods; and the communication of these differences served to further educate the parents about classrooms.

This task orientation regarding classroom placement, coupled with the task orientation which existed in the parent groups with respect to parenting skills, is one of the reasons we feel that the existence of the three components in combination was as important to the success of the program as were the components singly. The task orientation which the structure of the MMPP provides cuts across individual dimensions to bring teachers, parents, and

children together for specific goal-related activities and seems to provide the mechanism by which a process of working together came to be the expected mode of behavior.

In addition, the existence of the three dimensions provided for a high frequency of contact time between parents, teachers, and children: at home with children present, at home without children present, at school with children present, at school without children present. The MMPP was a very pervasive intervention program. This heavy impact, particularly in the first two years of the program, in conjunction with the assistance the staff offered in transition out of the program provided, in our opinion, appropriate experience for the parents and children to build an important foundation for further growth after the program's completion.

Another point we would make and which is not unrelated to the task orientation concerns the large amount of energy put forth by the staff in implementing this program. As mentioned above, we did not seek to select teachers who were obviously "stars." In fact, two of the teachers, one at each of two sites, were judged by the project directors to be poor teachers who were doing the best they could with the talent they possessed, while at the same time adequately performing the required tasks. As was mentioned above, one of those tasks required teachers to collect massive amounts of data on children's progress and on parent-child interaction and to consider that information in planning instruction. It is our judgment that the constant evaluation activities required of the teachers and, equally important, the fact that the teachers were required to work together both within and, periodically, across sites were two necessary elements which motivated the large amount of energy we feel is necessary to the success of any intervention program. We would, of course, be negligent if we did not add here that the site coordinators <u>were</u> stars in many respects, particularly in their role as supervisor. It was the site

coordinator at each site who created the cohesiveness the program required.

To summarize, many early childhood intervention programs have demonstrated significant cognitive gains and while there has been recent evidence that some of these gains are lasting (Lazar, et al, 1977) researchers have nevertheless continued to urge the design of programs which integrate preschool and primary school education, which tailor curricula to the needs of individual children, which utilize both home and school environments to effect change, and which are focused on varying SES and geographically-located populations. The program reported in this paper considered those points in all aspects of its design and implementation. The positive results reported here are supportive of the feasibility and success of such an approach.

While longer-term effects await the collection of follow-up data on the children during their elementary schooling, we feel that the results reported here warrant considerable optimism about the success of the MMPP. The consistent and continued growth of the children in a variety of areas of functioning related to schooling is one part of the reason for that optimism. The MMPP applied a multi-dimensional approach, simultaneously focusing on the three dimensions of parental involvement, home-school relations, and individualized education through the provision of alternative curricular strategies. We attribute the results to that combination of emphases; it appears to be an extremely fruitful approach to intervention.

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Table 1

Description of the MMPP Participants in Terms of Percentages of Group Within Demographic and Entrance Criterion Categories

Entry level categories	Group: Large urban		Small urban		Rural		Total group	
Demographic variables[a]	N	%	N	%	N	%	N	%
Income level[b]								
Below $4,000	8	17.78	3	4.08	4	9.52	15	11.19
$4,000-6,000	7	15.56	8	18.37	6	14.29	23	15.67
$6,000-8,000	7	15.56	5	12.24	15	35.71	27	20.15
$8,000-10,000	10	22.22	16	32.65	14	33.33	40	29.85
$10,000-12,000	10	22.22	12	26.53	3	7.14	25	18.66
Above $12,000	3	6.67	3	6.12	-	0	6	4.48
Marital status[c]								
Single-parent family	17	37.78	9	19.15	9	21.43	35	26.12
Two-parent family	28	62.22	38	80.85	33	78.57	99	73.88
Parent education								
Below high school								
Mother	0	0	0	0	0	0	0	0
Father	1	2.63	6	13.95	3	8.57	10	8.62
1-3 yrs. high school								
Mother	7	15.56	11	23.91	8	19.05	26	19.55
Father	4	10.53	6	13.95	5	14.29	15	12.93
Graduated high school								
Mother	25	55.56	30	65.22	24	57.14	79	59.40
Father	0	52.63	23	50.00	21	60.00	64	55.17

Table 1 (cont.)

Entry level category	Group: urban		Small urban		Rural			
	N	%	N	%	N	%	N	%
Parent education (cont.)								
1-3 Yrs. college								
Mother	11	24.44	3	6.52	6	14.29	20	15.04
Father	7	18.42	7	16.28	3	8.57	17	14.66
Graduated college								
Mother	2	4.44	2	4.35	4	9.52	8	6.02
Father	6	15.79	1	2.33	3	8.57	10	8.62
Parent age								
Below 20								
Mother	0	0	0	0	1	2.44	1	.75
Father	0	0	0	0	0	0	0	0
20-24								
Mother	8	17.78	21	44.68	11	26.83	40	30.08
Father	0	0	11	25.58	7	20.59	18	15.52
25-29								
Mother	25	55.56	18	38.30	21	51.22	64	48.12
Father	18	46.15	19	44.19	14	41.18	51	43.97
30-34								
Mother	9	20.0	4	8.51	4	9.76	17	12.78
Father	18	46.15	8	18.60	5	14.71	31	26.72
35-39								
Mother	1	2.22	1	2.13	4	9.76	6	4.51
Father	1	2.56	1	2.33	7	20.59	9	7.76

Table 1 (cont.)

Entry level category	Group: Large urban		Small urban		Rural		Total group	
Parent age (cont.)								
40-44								
Mother	1	2.22	1	2.13	0	0	2	1.50
Father	1	2.56	1	2.33	1	2.94	3	2.59
45 or above								
Mother	1	2.22	2	4.26	0	0	3	2.26
Father	1	2.56	3	6.98	0	0	4	3.45
Child's sex								
Male	29	64.44	30	63.83	24	57.14	83	61.94
Female	16	35.56	17	36.17	18	42.86	51	30.06
Criterion Variables[d]								
Home environment	26	57.78	25	53.19	25	59.52	76	56.72
Older siblings	19	42.22	23	48.94	23	54.76	65	48.51
Cognitive/language delays	23	51.11	26	55.32	22	52.38	71	52.99
Unsolicited parental concern	14	31.11	15	31.91	12	28.57	41	30.6

[a]With the exception of income data, demographic data is self-report.

[b]All participants were below 70% state median income when adjusted for family size

[c]In many instances, mothers provided data on the child's father, although the father was not living at home

[d]Persons may belong to more than one category

Table 2

Mean PPVT Percentiles Across the Three Years of the MMPP

Time Period	All sites N=98		Large urban N=34		Small urban N=32		Rural N=32	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1. Sept. SY I	32.63	30.7	34.85	32.7	30.12	32.5	32.78	27.4
2. June SY I	51.88	30.1	52.88	32.0	57.03	27.2	45.66	30.5
3. Sept. SY II	52.28	31.2	50.68	35.3	58.50	27.0	47.75	30.3
4. Jan. SY II	57.04	29.0	47.53	30.6	63.12	27.4	61.06	26.8
5. June SY II	62.01	26.9	55.71	29.7	67.09	22.0	63.62	27.6
6. Sept. SY III	64.23	26.7	62.94	29.4	69.87	27.0	59.97	23.1
7. Jan. SY III	71.46	27.7	68.62	31.2	72.59	25.7	73.34	26.4
8. June SY III	73.26	24.1	64.62	25.5	85.50	18.2	70.19	23.4
Correlated 2-tailed t-test probability, Time 8 - Time 1	$t(97)=13.35$ $p << .001$		$t(33)=6.34$ $p << .001$		$t(31)=9.60$ $p << .001$		$t(31)=8.51$ $p << .001$	

Table 3

Mean PPVT Percentiles for Students Leaving MMPP Early

		A Students remaining at least two years N=14			B Students remaining from one year to two years N=13			C Students remaining less than one year N=101		
Time Period		N	Mean	S.D.	N	Mean	S.D.	N	Mean	S.D.
1. Sept.	SY I	14	39.71	36.9	13	28.15	39.7	7[a]	20.29	30.8
2. June	SY I	14	67.71	28.5	12	46.92	35.7	--	--	--
3. Sept.	SY II	14	65.29	27.4	6	54.67	32.5	--	--	--
4. Jan.	SY II	14	69.50	27.6	--	--	--	--	--	--
5. June	SY II	14	76.79	24.2	--	--	--	--	--	--
6. Sept.	SY III	2	86.00	9.9	--	--	--	--	--	--
7. Jan.	SY III	2	92.50	7.8	--	--	--	--	--	--
8. June	SY III	--	--	--	--	--	--	--	--	--

[a] Two of these students, remaining less than 2 months, were not tested on the PPVT.

Table 4

Mean Percentages of Students Passing Each Subscale of the CSAB: MMPP and Norming Group

All Sites

			SY I		SY II		SY III	
			Fall	Spring	Fall	Spring	Fall	Spring
		(N)	(97)	(97)	(96)	(98)	(98)	(98)
Category								
OE		MMPP	22.8	41.3	39.71	52.3	57.1	78.1
	NORM	MID SES	--	--	53.6	61.9	56.4	65.8
	NORM	LO SES	--	--	41.8	48.9	46.4	53.8
CORD		MMPP	13.7	33.5	42.6	57.4	62.8	88.3
	NORM	MID SES	--	--	57.8	67.1	72.6	86.2
	NORM	LO SES	--	--	39.4	60.8	65.4	74.0
DISC		MMPP	29.8	58.3	64.2	78.0	77.9	90.8
	NORM	MID SES	--	--	74.6	79.4	79.7	87.3
	NORM	LO SES	--	--	56.3	69.9	73.1	81.8
MEM		MMPP	0.3	8.3	10.4	24.1	25.8	45.2
	NORM	MID SES	--	--	16.3	20.7	18.6	25.3
	NORM	LO SES	--	--	9.0	11.3	15.3	21.0
COMP		MMPP	18.1	34.7	40.6	50.0	52.9	72.1
	NORM	MID SES	--	--	47.0	58.3	53.6	64.8
	NORM	LO SES	--	--	34.0	45.2	45.4	55.2

Table 5

Mean Percentages of Students Passing Each Subscale of the CSAB: MMPP and Norming Group By Site

Site	Category		SY I		SY II		SY III	
			Fall	Spring	Fall	Spring	Fall	Spring
		(N)	(34)	(34)	(34)	(34)	(34)	(34)
	OE		19.84	43.01	39.53	52.20	57.90	79.06
Large	CORD		17.31	34.63	35.61	53.27	67.64	88.24
urban	DISC		29.41	59.07	61.40	78.68	75.99	92.5
	MEM		0	8.80	11.73	19.60	21.57	41.17
	COMP		15.63	36.49	40.89	46.97	55.88	74.0
		(N)	(32)	(31)	(30)	(32)	(32)	(32)
	OE		23.62	39.32	41.68	55.66	54.48	74.01
Small	CORD		12.49	27.60	37.79	54.84	60.77	86.44
urban	DISC		33.84	63.83	67.77	79.03	83.07	90.24
	MEM		1.03	6.47	7.77	28.10	29.17	50.00
	COMP		21.28	35.49	40.97	54.77	47.35	59.86
		(N)	(31)	(32)	(32)	(32)	(32)	(32)
	OE		25.2	41.01	38.08	48.82	58.98	81.06
	CORD		11.11	37.83	54.51	64.22	59.72	90.26
Rural	DISC		26.09	52.20	63.92	76.30	74.74	89.44
	MEM		0	9.37	8.33	25.00	27.07	44.80
	COMP		17.64	32.11	39.05	48.33	55.37	82.32

Table 6

MMPP DDST Frequencies

Site	Group	Sept. SY I		June SY I		Sept. SY II		Jan. SY II		June SY II	
		N	%	N	%	N	%	N	%	N	%
	1	2	5.88	1	2.94	1	2.94	1	2.94	0	0
Large	2	5	14.71	5	14.71	2	5.88	1	2.94	1	2.94
urban	3	22	64.71	28	82.35	3	91.18	32	94.12	33	97.0
	4	5	14.71	0	0	0	0	0	0	0	0
		(N=34)		(N=34)		(N=34)		(N=34)		(N=34)	
	1	0	0	0	0	1	3.23	1	3.13	0	0
Small	2	5	16.13	1	3.13	1	3.23	2	6.25	1	3.13
urban	3	19	61.29	24	75.00	28	90.32	28	87.50	31	96.80
	4	7	22.58	7	21.88	1	3.23	1	3.13	0	0
		(N=31)		(N=32)		(N=31)		(N=32)		(N=32)	
	1	1	3.13	0	0	0	0	0	0	0	0
Rural	2	7	21.88	1	3.13	2	6.45	3	9.38	4	12.50
	3	19	59.38	30	93.75	29	93.55	29	90.62	28	87.50
	4	5	15.62	1	3.10	0	0	0	0	0	0
		(N=32)		(N=32)		(N=31)		(N=32)		(N=32)	
	1	3	3.09	1	1.02	2	2.08	2	2.04	0	0
All	2	17	17.53	7	7.14	5	5.21	6	6.12	6	6.12
sites	3	60	61.85	82	83.67	88	91.67	89	90.82	92	93.88
	4	17	17.53	8	8.16	1	1.04	1	1.02	0	0
		(N=97)		(N=98)		(N=96)		(N=98)		(N=98)	

Note. Group key: 1=Abnormal, 2=Questionable, 3=Normal, 4=Untestable

Table 7

Mean Percentiles on the CPSI Year III

Time Period		N	All sites Mean	S.D.	N	Large urban Mean	S.D.	N	Small urban Mean	S.D.	N	Rural Mean	S.D.
6. Sept.	SY III	98	81.44	19.7	34	76.03	24.1	32	86.03	15.7	32	82.59	17.2
7. Jan.	SY III	98	89.77	12.8	34	86.82	17.9	32	90.03	10.4	32	92.62	6.5
8. June	SY III	97[a]	93.65	8.5	34	92.62	12.3	31	93.81	5.4	32	94.59	5.9

[a] One student in the small urban site was not tested on this instrument at Time 8.

Figure 1

Yearly Growth in terms of PPVT Percentile Means Across the Three Years of the MMPP